

Name: _____

Solve each exponential equation by taking the log of both sides.

1. $2^x = 9$ $\log 2^x = \log 9$ $x \log 2 = \log 9$ $x = \frac{\log 9}{\log 2}$
 $x \approx 3.1699$

2. $16^x = 5$ $\log 16^x = \log 5$ $x \log 16 = \log 5$ $x = \frac{\log 5}{\log 16}$
 $x \approx 0.5805$

3. $4^x = 20$ $\log 4^x = \log 20$ $x \log 4 = \log 20$ $x = \frac{\log 20}{\log 4}$
 $x \approx 2.1610$

4. $7 = 3^{x-2}$ $\log 7 = \log 3^{x-2}$ $\log 7 = (x-2) \log 3$
 $\frac{\log 7}{\log 3} = x-2$ $x = \frac{\log 7}{\log 3} + 2$ $x \approx 3.7712$

5. $6^3 = 5^{2x}$ $\log 6^3 = \log 5^{2x}$ $3 \log 6 = 2x \log 5$ $\frac{3 \log 6}{2 \log 5} = x$
 $x \approx 1.6699$

$$6. \quad e^x = 61 \quad \ln e^x = \ln 61 \quad x \ln e = \ln 61 \quad x = \ln 61$$

$$x \approx 4.1109$$

$$7. \quad e^{4+x} = 8 \quad \ln e^{4+x} = \ln 8 \quad (4+x) \ln e = \ln 8 \quad 4+x = \ln 8$$

$$x = \ln 8 - 4 \quad x \approx -1.9206$$

$$8. \quad 11^{-9x} - 9 = 14 \quad 11^{-9x} = 23 \quad \log 11^{-9x} = \log 23$$

$$-9x \log 11 = \log 23 \quad -9x = \frac{\log 23}{\log 11} \quad x = \frac{\log 23}{-9 \log 11}$$

$$x \approx -0.1453$$

$$9. \quad 8^{4x} - 4 = 63 \quad 8^{4x} = 67 \quad \ln 8^{4x} = \ln 67 \quad 4x \ln 8 = \ln 67$$

$$x = \frac{\ln 67}{4 \ln 8} \quad x \approx 0.5055$$

$$10. \quad 2e^{\frac{1}{2}x} + 3 = 10 \quad 2e^{\frac{1}{2}x} = 13 \quad e^{\frac{1}{2}x} = \frac{13}{2} \quad \ln e^{\frac{1}{2}x} = \ln(6.5)$$

$$\frac{1}{2}x \ln e = \ln 6.5 \quad \frac{1}{2}x = \ln 6.5 \quad x = 2 \ln 6.5$$

$$x \approx 3.7436$$